



For Solutions...
For Success.



Case Study #1107

More Power. More Control.

Cuyahoga County pumps value to its community through greater control, standardization and technological advancements.

Cuyahoga County is the most populous county in Ohio, with nearly 1.4 million residents. Part of Greater Cleveland, the county is named after a Native American word meaning "crooked river." With more than 63% of its total area made up of water, the county strives to foster strong neighborhoods, support safe housing, and promote economically sound communities for the 19 villages, 2 townships and 38 cities serves.



The Sanitary Engineering Department for Cuyahoga County contracts with many of these communities to operate and maintain their wastewater systems. In the late '80s, this department was operating more than 30 aging sewage pump stations – all of which were from various manufacturers, requiring significant maintenance. A team of engineers and operators within this department was charged with the challenge of keeping the various sites operational. One member of this team was the department's current chief engineer, Mr. Bill Schneider. "Buying replacement parts became a major effort," shares Schneider. "The length of time we were spending with the pump infrastructure forced us to recognize the need to set standards and streamline." Schneider and the rest of the Cuyahoga County wastewater engineering and operations team set out to design a county-wide, standardized plan for pump stations, which, over the years, has been perfected to improve ease of operation and maintenance.

The Need for Safety. The Need for Speed.

The decision to develop a strategic plan to migrate from multiple pumps to a single source manufacturer was further driven by the need to improve safety. "Maintenance personnel were previously forced to go underground to service waste pumps," adds Schneider. "One of our priorities was to eliminate the confined space entry over time so that our people stayed safe when doing their jobs." Further, the county found that repairing aging pump stations would continue to add unnecessary expense to cities, as well as the public.



After a careful review of all available pump options, Gorman-Rupp pump stations were selected. Previous experience with the technology, the brand's reputation for quality and durability, as well as quick service were key factors in the decision. The Craun-Liebing Company, an authorized Gorman-Rupp distributor for wastewater equipment and technology was brought in to consult in the planning process.

"With multiple pump stations and everything that diversity brings with it, Cuyahoga County had a real challenge locating replacement parts in a quick, efficient and cost effective manner," shares Randy Keefe, President of Craun-Liebing. The county quickly recognized that some of the Original Equipment Manufacturers were completely out of business, while others were dealing with obsolete

pumps, forcing the county's operations group to resort to make-shift parts. In some of the worse case scenarios, the original pump manufacturer may have only had the part pattern available, but a foundry would then have to generate a casting, which then had to be machined before it was sent to the county. "It wasn't uncommon for Cuyahoga to experience lead times of 12 plus weeks for parts," adds Keefe.

The REAL Cost of Pumping

To approach the challenge of designing a single manufacturer platform from the ground up, Cuyahoga County took several factors into account. Long-term effectiveness of the operation remained the primary consideration. After conducting a careful analysis, the county found strong evidence to support the fact that migrating to self-priming, centrifugal pumps throughout its collection system would reduce the Total Cost of Ownership. "Even if submersible pumps were less expensive initially, the self-priming pumps proved to be easier to maintain and more reliable in terms of keeping the stations running. If you're going to be living with something for 30 years, you need to look at the cost of that equipment over time," shares Schneider.



"The reality of it is that when submersible pumps fail, they often fail catastrophically. And when they do, you're looking at higher replacement costs," adds Keefe. "Submersibles have their place in the market, but they're not as adaptable from initial to future conditions as self-priming pumps are." Because of the submersible pump's design, end-users are generally locked into a specific rail system, configuration and base elbow size. Therefore, replacing pumps with larger pumps can be a real challenge for a municipality. "If you have a system that you think will grow in time, and you don't want to spend an outrageous amount of money to gut and replace the pump and control equipment that's already there, a self-priming pump is very beneficial," adds Keefe.

As a result of the transition to self-priming technology, Cuyahoga County now can purchase replacement parts for their pump stations and rebuild rotating assemblies with their own personnel, often within the same day. Submersible pump technology dictates that the pump must go back to the original manufacturer or an authorized repair center.

The new protocol further enhanced the county's efficiencies by narrowing its pump specifications to three primary models. Craun-Liebing and Gorman-Rupp belt drive the pumps in the county's systems, which means a full diameter impeller is installed in all stations for that particular pump model. This allows the county to maintain rotation assemblies for three-inch, four-inch or six-inch pumps that cover all their stations. "Pumps of a common size located at different sites are not all operating at the same hydraulic design conditions or pump speeds, by any means – but that doesn't matter. The only thing that really matters is that the parts are on the shelf when they need them, keeping the pumps up and running," offers Keefe. "The alternative is waiting for the pump to be repaired at a manufacturer's or authorized repair centers facility – which leaves the municipality or sewer district operating on one pump at that point. That's a very precarious situation if that pump goes down or if it is unable to keep up with specific flow requirements, particularly in wet weather."

"The ability to adapt to various pumping conditions by simply changing the speeds of the pumps to increase or decrease capacity is attractive," adds Schneider.

Standardizing to self-priming technology provides the latitude to change speeds on the pumps, while getting more performance down the line. Therefore, as growth dictates, speed can be changed without replacing the core pump, motor or control equipment. The pump begins its operation at a lower speed initially, and then adjusts to a higher speed in the future without the need to change-out expensive components.



Control in the Hands of the Engineers

In the newly converted system, electronic controls – and how those controls interface with a monitoring system – were also a key priority to Schneider and the rest of Cuyahoga’s engineering team. Today, Cuyahoga utilizes a Motorola MOSCAD monitoring system, which is capable of System Control And Data Acquisition (SCADA). Gorman-Rupp and their representatives have worked closely with the county’s engineers and Motorola authorized agent to interface the control and monitoring aspects of their stations. Because Gorman-Rupp is more than just a manufacturer of pump technology – but a total systems builder as well – Cuyahoga County’s needs were met not just in terms of reliable pumps, but also in creating an interface between the pumps’ controls and the county’s SCADA supplier. The county has decided to utilize the Motorola system for data acquisition and fault monitoring, with Gorman-Rupp building the control systems, providing the necessary PLC control logic programming, etc. Gorman-Rupp receives, mounts and factory wires the MOSCAD internal to their pump control panel or MCC.

In doing so, Cuyahoga County can easily transmit a mass of relevant pump operation data back to one central engineering operation, as desired. “We’re up to 25 different status and alarm conditions that can be derived from our standard design,” adds Schneider. “This is information that can be telemetered back to county offices, providing an accurate and ongoing perspective regarding what’s happening at each station, while identifying faults accurately. The maintenance crew that’s been engaged to address the situation has a pretty good understanding of what the problem is even before they arrive at the pump station. This helps us to address any problems that may arise, faster.”



To add to its level of service and commitment, three managers rotate a 24-hour cell phone that allows for instant notification, if a critical problem should occur. The managers utilize remote computers that are linked into the SCADA system to define and analyze the fault condition, from any location.

The SCADA system allows county personnel to further analyze data first thing in the morning, in the middle of each business day and again at the end of the day. On the weekends, data is analyzed once each day – more frequently when storms are apparent or special conditions exist at a particular site – to ensure that pumping capacity, especially at the larger sites, is functioning. “Cuyahoga County has clearly set high standards for data acquisition and information monitoring”, acknowledges Keefe.

The Ultimate Back Up Plan

Cuyahoga County also moved to take control of the need for backup capability. In the event of a power outage, the pumps rely on a natural gas-driven engine backup system instead of a traditional generator. Doing so allows county personnel to perform routine maintenance on the natural gas “Autostart” engines and better address emergency situations, should a problem occur during foul weather. A standby generator usually requires a call to the generator’s authorized repair center to fix the problem, whereby with the Gorman-Rupp AutoStart system, Cuyahoga personnel can be enacted within the hour.

“Within the last three to four years, Gorman-Rupp’s AutoStart design has been enhanced with better quality, quieter, smoother operating engines, along with upgraded control options that include a more flexible PLC-based DC powered control,” adds Keefe. The AutoStart backup plays right into the county’s goal of meeting their customers needs and getting systems back up and running with their own people – regardless of whether the outage is due to a true utility outage, a lightning strike, a power surge or any other malfunction.

Growing, Growing, Gone

In this well-populated county, ongoing development has brought about the need to pump longer distances with increased elevation changes. This requires pumps capable of operating at higher pressures – traditionally at a significant expense. Because the expense and complexity had previously been anticipated to outweigh rewards, further development in certain areas within the county had been delayed. However, as a result of new self-priming



pump design technology recently introduced by Gorman-Rupp, development plans have moved forward.

In one such area within the county slated for new development and elimination of an existing treatment plant, the total elevation change from the lowest site to the receiving manhole is approximately 400 feet. To meet the challenge, the county is now using a new self-priming pump design offered by Gorman-Rupp, the Ultra V with second stage Ultra Mate, allowing for greater pumping efficiency, significantly higher heads and increased flow rates. To meet the flow and head needs for this application, they have designed two separate pump stations. The first station to be installed will be positioned halfway up the hill and will be sized to pump the flow from

new development, as well as the flow that will come from elimination of the treatment plant below. Once that initial station is operational, the treatment plant on the lower level will also be replaced with a second station utilizing the Ultra V self-priming pump technology.

Initially, the County plan called for the installation of three pump stations, each having two force mains and two sets of pumps to address varying flow conditions. However, the flexibility and higher head capabilities offered through the Ultra V with second stage Ultra Mate will now allow the county to install only two stations, each discharging through one force main. Both stations will utilize the same pump model and duplicate impellers, allowing for parts interchangeability. The use of variable speed drives supplied by Gorman-Rupp as part of a complete, single source pumping system, will provide the control necessary to address the initial and future flow requirements. "Right away, the cost of the project and related pump stations was reduced – and so was the plan area requirement (footprint) at each site, as well as the electrical consumption. Overall, the cost of ownership based on a lifecycle analysis of the Ultra V with Ultra Mate is less when compared to alternative non-clog pump designs. Additionally, the Ultra V is easier to operate and maintain, which is consistent with other lines of self-priming pumps offered through Gorman-Rupp," adds Keefe.

"This new technology changes the mindset of the design engineer regarding what's available," shares Schneider. "For sewage pumping, this is definitely a new tier we have not been able to even think about. We were very skeptical at first, as the county has been introduced to a number of things over the years from other manufactures that haven't really panned out. But, we took our team to the Gorman-Rupp manufacturing plant, witnessed the operational test and performance of this new technology first hand, and were impressed with both the flexibility and the very high heads the Ultra V can offer. This, coupled with the operator friendly O&M needs of the Gorman-Rupp self-priming pumps, made the Ultra V an attractive product for our organization."

About The Gorman-Rupp Company

The Gorman-Rupp Company is a leading manufacturer of pumps and pumping systems for the municipal, water, wastewater, sewage, industrial, construction, petroleum, fire and OEM markets. Pumps include self-priming centrifugal, centrifugal, submersible, trash, priming assist, rotary gear and air-driven diaphragm pumps. In addition, The Gorman-Rupp Company manufactures a complete line of packaged lift stations and booster stations, which include pumps, motors, controls, piping, accessories and enclosures. The company prides itself on manufacturing and delivering the right pump for the job.